

Appendix F: Draft Floodplain Statement of Findings

DRAFT STATEMENT OF FLOODPLAIN FINDINGS FOR SOUTH FORK MERCED RIVER BRIDGE REPLACEMENT PROJECT

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INTRODUCTION

Description of the Proposed Action:

This project involves removing the existing bridge that carries traffic on Wawona Road (Highway 41) across the South Fork of the Merced Wild and Scenic River (South Fork Merced River). In order to cross the river, all vehicle traffic must use this bridge, which conveys nearly one- third of Yosemite's annual visitors. The bridge would be replaced with a single- span structure, and a temporary Bailey bridge (constructed when the existing bridge on the South Fork Merced River was condemned and closed in 1998), currently carrying traffic across the river, would be removed. This project has several purposes, including:

- To protect visitor health and safety by eliminating and replacing the condemned and closed bridge with a wider, safer structure; by opening the permanent roadway; and by removing the concrete barriers.
- To remove the temporary bridge, which has served beyond its original intent and has created a visual intrusion on an otherwise popular scenic location.
- To protect park infrastructure from bridge collapse, specifically the reclaimed waterline, sewerline, high- voltage electrical line conduit, and telecommunications lines that are attached to the bridge.
- To prevent the difficult and potentially dangerous removal of bridge debris from the river that would result if the bridge collapsed.
- To protect park resources from localized flooding that could result from uncontrolled bridge collapse and resultant damming during a high- flow period.
- To protect and enhance the Merced Wild and Scenic River Outstandingly Remarkable Values by removing impediments to the free- flowing condition of the river, i.e., replacing two in- river piers and abutments with a new single- span bridge (there will be no in- river piers).

Two alternatives are analyzed in the environmental assessment prepared for the South Fork Merced River Bridge Replacement Project. Alternative 1 (No Action) describes the impacts that would result if the existing bridge were not replaced, and the temporary Bailey bridge remained in place. Alternative 2 (Preferred Alternative) would entirely remove the existing bridge, replace it with a single- span bridge, and would remove the temporary Bailey bridge and access. The proposed bridge would be 13- feet wider than the old bridge and would span the entire South Fork Merced River without the need for center support piers, thus restoring a more natural flow through this river reach. During construction of the new bridge, traffic would continue to be

routed over the temporary Bailey bridge so there would be minimal impact on current traffic flows. Upon completion of the new bridge, the existing asphalt roadway would be pulverized in place and used as a base for new pavement. The temporary Bailey bridge and the transitional road segments would be removed, and the area surrounding the temporary bridge site would be restored.

Site Description

The site for the proposed project encompasses approximately 0.22 mile of South Fork Merced River floodplain in Wawona. Wawona consists of National Park Service and privately owned land; most of the private land lies within Section 35 of the U.S. Geological Survey topographic quadrangle map covering this area. Utility lines are currently attached to the South Fork Bridge and provide water, sewage, electricity, and communications services for the Wawona Golf Course, Wawona Hotel, and the wastewater treatment facility pump station.

The South Fork Merced River originates at an elevation of 10,500 feet at the drainage divide with the Merced Peak Fork, flows westward, and joins the Merced River 43 miles from its headwaters, west of El Portal, on land administered by the U.S. Forest Service. Headwaters for the South Fork Merced River are in the vicinity of Triple Divide Peak, where flows are westerly over granitic bedrock to Wawona. Site elevations range from approximately 4,020 feet in the river bottom, approximately 4,033 feet at the northern project terminus, and approximately 4,047 feet at the southern project terminus. The riverbanks, which consist predominantly of constructed rock walls with some riprap, are approximately 25- feet high, vertical on the southern bank, and steeply sloped on the northern bank.

The average annual discharge of the South Fork Merced River is approximately 250,000- acre feet of water. The river drains approximately 76,000 acres within the park boundary and approximately 63,000 acres of watershed drains through Wawona. The average mean stream flow at the South Fork Bridge site is approximately 174- cfs. The historic average annual flow of the South Fork Merced River, at its confluence with the Merced River, is 356- cfs; the minimum recorded flow was 2.2- cfs, while the maximum recorded flow was 46,500- cfs.

Upstream from the bridge site, tributaries to the South Fork Merced River enter a steep- walled canyon or glacial gorge, emerging into the large floodplain meadow or deep alluvial valley of the Wawona area. Alluvial processes were altered historically due to development related to bridge placement and road construction along streambanks. The South Fork Merced River floodplain within the project site may also be affected by water diversion conducted under the Wawona Water Conservation Plan, which includes provisions for reduction and/or cessation of withdrawals when streamflow drops to critical levels.

The vegetation of the site consists of riparian plant communities, wetlands, and upland plant communities. Narrow bands of mixed palustrine forest and lower montane tree species occupy the riverbanks adjacent to the bridge abutments. These stands consist of ponderosa pine, white alder, and incense- cedar in the overstory; Douglas- fir and California black oak trees are also present on the north riverbank east of the temporary bridge. California black oak may have been the dominant floodplain tree of the South Fork Merced River historically; however, fire suppression has resulted in present- day ponderosa pine dominance and incense- cedar understory dominance. Wetland vegetation of the project site includes sandbar willow, sedges, horsetail or scouring- rush, rushes, thistles, and blackberry. Upland plant communities are relatively sparse in the South Fork Bridge site, and have been historically disturbed. Ponderosa pine is the dominant tree species in these communities, and common herbaceous species observed included the forbs aster, sagewort, peppergrass, rockcress, sheep sorrel, and mullein, and the grasses blue wildrye, foxtail barley, and brome. Several of the herbaceous species are non- native or have been introduced into the Yosemite National Park environs and persist on disturbed roadside soils.

Six major soil types have been identified for the Wawona area. These soil types consist primarily of residual soils on slopes and alluvial soils on the valley floor including stony loamy sand, silt loam, sandy loam, and coarse sandy loam. These soils are moderately to strongly acidic and depths vary from 2 to 4 feet in thickness. These soils are subject to erosion and alluvial processes, including the development of meandering streambeds, floodplains, and wetlands.

General Characterization of the Nature of Flooding in the Area

The Merced River watershed has had 11 winter floods since 1916 that have caused substantial damage to property. All of these floods took place between November 1 and January 31. The largest floods occurred in 1937, 1950, 1955, and 1997, and had discharge rates in the range of 22,000 to 25,000 cfs, as measured at the Pohono Bridge gauging station in Yosemite Valley. These floods were caused by warm winter rains falling on snow at elevations up to 8,600 feet (e.g., Tuolumne Meadows), partially melting the accumulated snow pack. The U.S. Army Corps of Engineers mapped the 100- year floodplain for Wawona in 1981 and the South Fork Bridge was within this area. It was also determined that the river channel can shift laterally during large floods in Wawona, which is characterized by an elongated alluvial valley. However, the drainage at the bridge site is relatively narrow and has entrenched approximately 20 to 25 feet.

Human- made structures such as bridges and buildings placed within a floodplain can impede natural flow. During floods, portions of the river that would normally flow into floodplain areas are forced under these structures, increasing the amount of channel discharge. The effect of these seemingly minor, flow- related changes can have effects, both upstream and downstream of the bridge on the South Fork Merced River. The higher discharge and reduced flow area cause a backwater effect (a deep, slow- velocity) to form upstream and high velocities to occur near and under the bridge opening. At times, large woody debris becomes lodged against the bridge piers, creating a damming effect.

JUSTIFICATION FOR USE OF THE FLOODPLAIN

Why the Proposed Action Must be Located in Floodplain

As discussed previously, this project is aimed at eliminating a health and safety risk associated with the bridge that provides passage over the South Fork Merced River. Because Wawona Road and the South Entrance of Yosemite National Park is the primary route of access for one- third of park visitors, it is imperative that the bridge over the South Fork Merced River is safe, operational, and in character with the surrounding area, including Wawona. There is an obvious need to construct such a bridge through the floodplain of the river.

Investigation of Alternative Sites

The possibility of building a bridge across the South Fork Merced River in a site outside of a floodplain does not exist, and therefore, no other alternative sites were considered.

DESCRIPTION OF SITE-SPECIFIC FLOOD RISK

Recurrence Interval of Flooding at the Site

Damage has occurred to the South Fork Bridge during flood events in 1937 and 1997. Both floods caused structural damage to the bridge, as well as substantial damage to park facilities and properties within the floodplain, including roads, picnic areas, offices, and lodging units. The 1997 flood, estimated to have a recurrence interval of 90 years, also altered natural features, causing downed trees, movement of landslide talus into streams, channel erosion, and significant changes in channel morphology.

Hydraulics of Flooding at the Site

The 100- year flood flow volume at the South Fork Bridge has been estimated at 13,563- cfs. However, it is believed that flood- stage discharge in this reach of the river could reach approximately 25,000- cfs.

Time Required for Flooding to Occur

The time required for flooding to occur is not currently known, but is expected to be relatively sudden.

Opportunity for Evacuation of the Site in the Event of Flooding

The opportunity to evacuate the South Fork Bride site is good, because it is relatively open and Wawona Road is available for escape from the area.

Geomorphic Considerations

Erosion of the riverbank has been affected by extensive and concentrated visitor use in popular areas of park rivers, introducing sediments into the river. The South Fork Merced River also carries sediments from the mountains which are deposited as alluvium farther downstream. As discussed previously, the bridge on the river constricts flood flows, causing backwater effects and increased velocities, altering the channel of the South Fork Merced River. The river channel in the Wawona area may also shift laterally in response to flood events, but this would be more likely downstream from the bridge site.

DESCRIPTION OF HOW THE ACTION WILL BE DESIGNED OR MODIFIED TO MINIMIZE HARM TO FLOODPLAIN VALUES OR RISK TO LIFE OR PROPERTY

The new bridge across the South Fork Merced River has been designed to span the entire river, eliminating the need for center support piers. This would restore a more natural flow in this reach of the river, which is anticipated to have a long- term, beneficial effect on the floodplain values near Wawona. Removal of the in- stream piers would reduce the backwater effects and high velocities that occur as a result of constricting flood flows. This would help to reduce erosion associated with these events, as well as the potential for catastrophic failure of the bridge. Eliminating the potential for catastrophic bridge failure would reduce the risks to life, property, and natural resources (e.g., soils and riparian vegetation) associated with flooding in this reach of the South Fork Merced River. The rock walls and riprap lining the riverbanks near the South Fork Bridge would continue to be maintained to reduce risks to life or property in this vicinity. Yosemite National Park would obtain all necessary permits prior to proceeding with such work, except in an emergency situation where the impacts would be documented shortly after the fact. The construction of the new bridge would not change the need to maintain this channel, and this would not result in any change in impacts when compared to the No Action Alternative. The bridge structure has also been designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR Part 60).

SUMMARY

Yosemite National Park proposes to remove the existing bridge that carries traffic on Wawona Road (Highway 41) across the South Fork Merced Wild and Scenic River. The bridge would be replaced with a single- span structure, and a temporary Bailey bridge (constructed when the existing bridge on the South Fork Merced River was condemned and closed in 1998), currently carrying traffic across the river, would be removed. Because Wawona Road and the South Entrance of Yosemite National Park represents the primary route of access for one- third of park

visitors, it is imperative that the bridge over the South Fork Merced River is safe, operational, and in character with the surrounding area, including Wawona. There is an obvious need to construct this bridge through the floodplain of the river. The possibility of building a bridge across the South Fork Merced River in a site outside of a floodplain does not exist, and therefore, no other alternative sites were considered.

A 1997 flood, estimated to have a recurrence interval of 90 years, caused damage to park property and natural features in the Merced River watershed, including the South Fork Merced River, and the South Fork Bridge. The 100- year flood flow volume at the South Fork Bridge has been estimated at 13,563- cfs. However, it is believed that flood- stage discharge in this reach of the river could reach approximately 25,000- cfs.

The new bridge across the South Fork Merced River has been designed to span the entire river, eliminating the need for center support piers. The lack of piers instream would restore a more natural flow in this reach of the river, having a long- term, beneficial effect on floodplain values near Wawona. Implementing the Preferred Alternative would reduce the potential for catastrophic bridge failure, thereby reducing the risks to life, property, and natural resources associated with flooding in this reach of the South Fork Merced River. Construction of the new bridge would not change the need to maintain rock walls and riprap lining the banks of the South Fork Merced River near the bridge, and this would not result in any change in impacts when compared to the No Action Alternative.